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(56) Documents Cited  
**GB 2192841 A EP 0397154 A**

(58) Field of Search  
UK CL (Edition K) **B7B BSB**  
INT CL<sup>5</sup> **B60R**

(54) A steering wheel mounted air-bag unit

(57) A steering wheel assembly incorporating an air-bag unit 13 has a steering wheel defining a space to receive the air bag-unit 13. A metal reinforced plastic cover 11 is provided to cover the air-bag 28. The cover 11 is resiliently mounted to the steering wheel so that downward movement of the cover can be used to activate a horn. If an air-bag unit is not required then the cover 11 can still be mounted to the steering wheel.

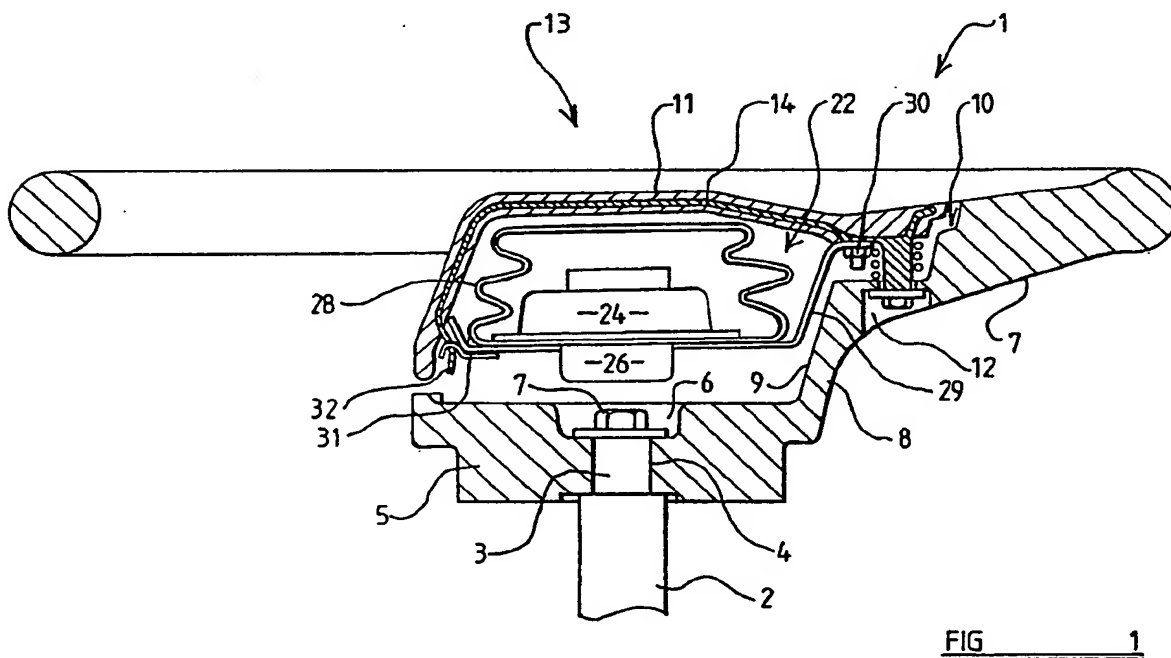


FIG 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

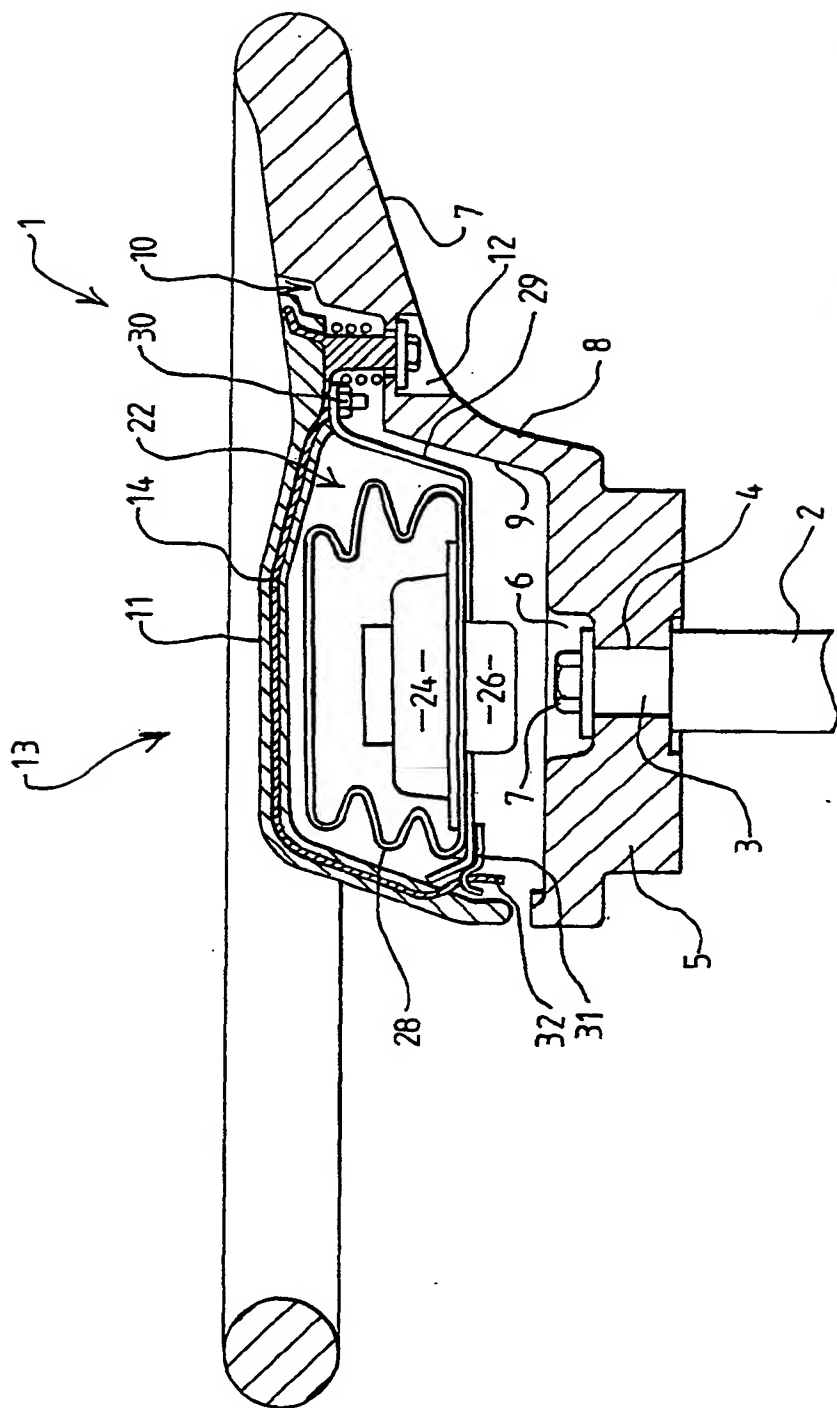


FIG 1

2 1 5

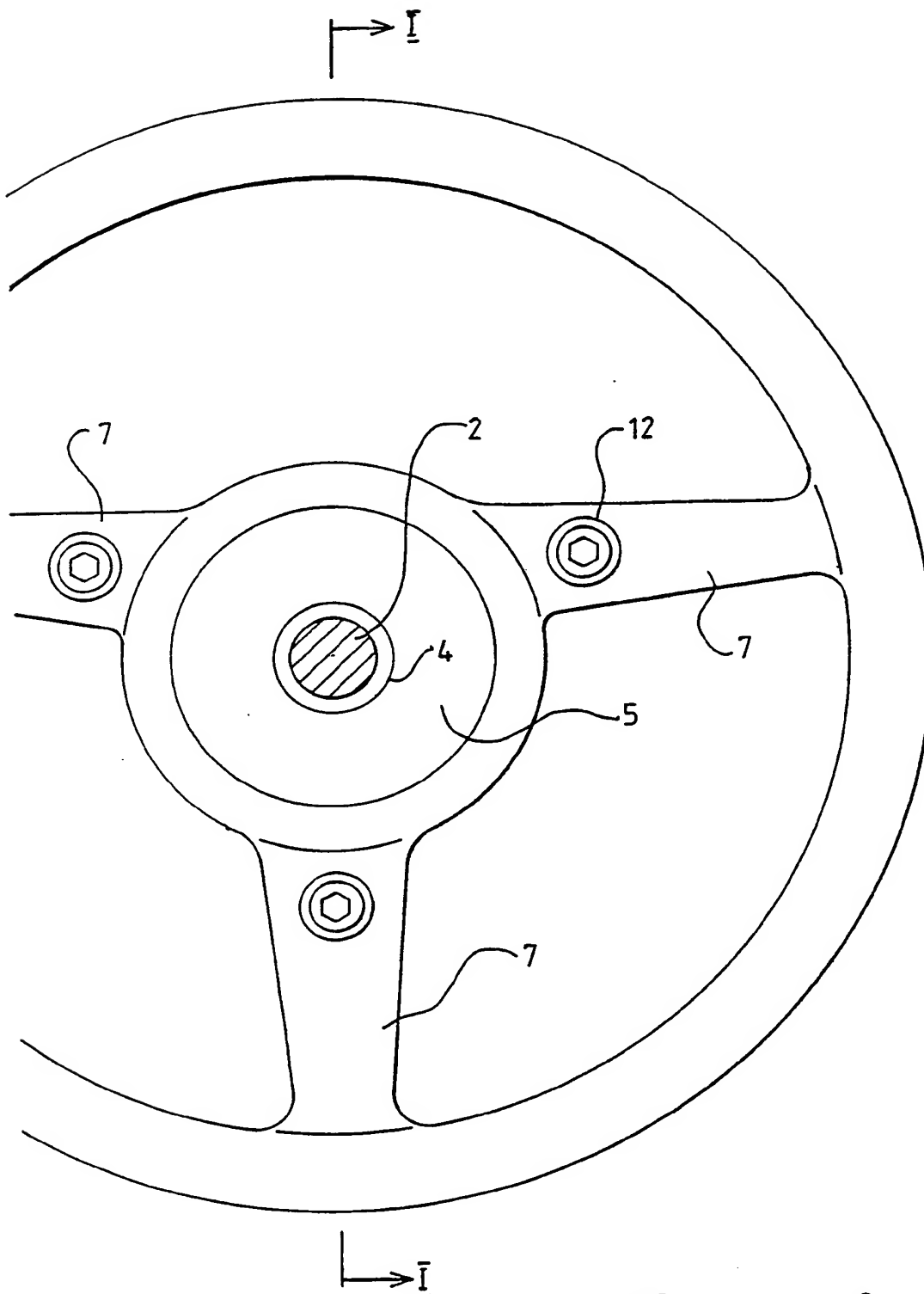


FIG 2

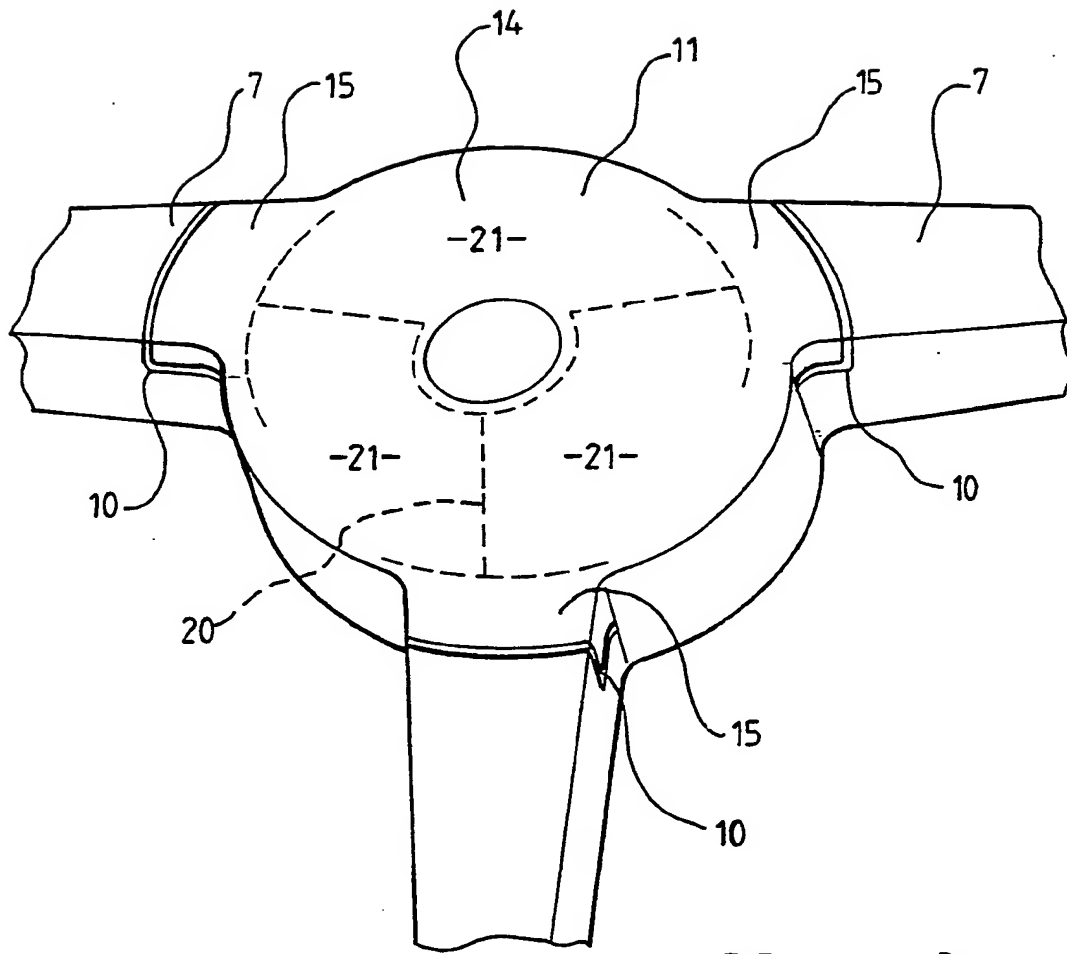


FIG 3

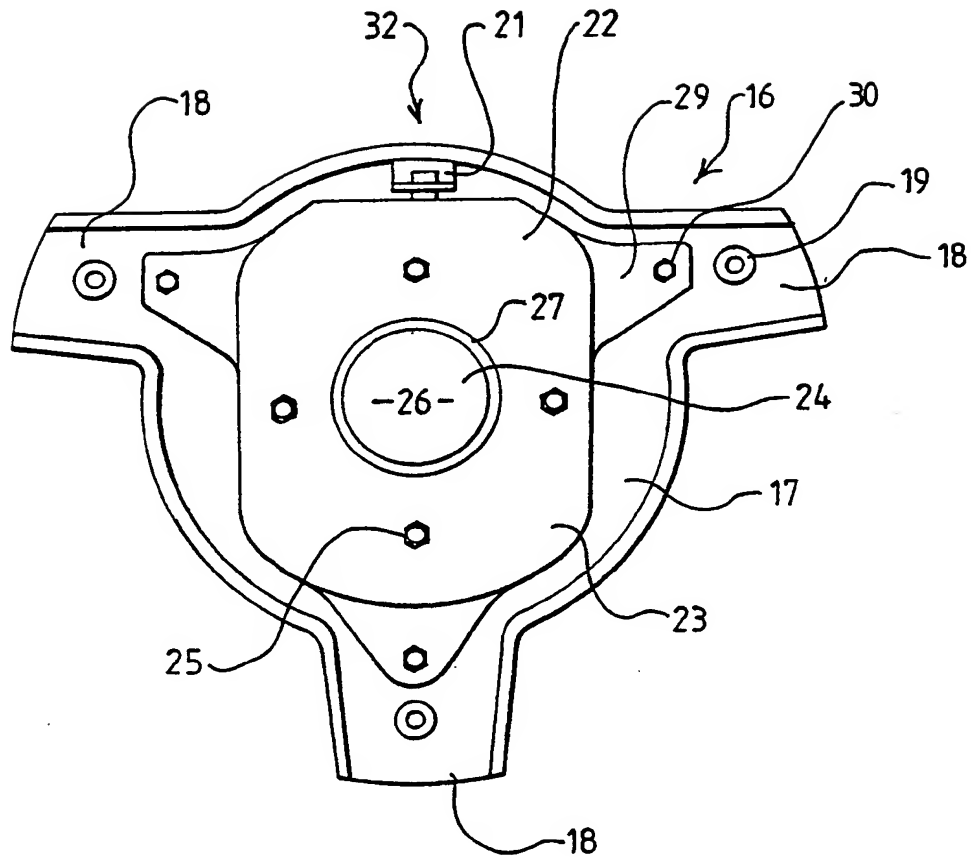


FIG 4



## DESCRIPTION OF INVENTION

## "IMPROVEMENTS IN OR RELATING TO A STEERING WHEEL ASSEMBLY"

THE PRESENT INVENTION relates to a steering wheel assembly and more particularly relates to a steering wheel assembly which incorporates an air-bag unit.

It has been proposed previously to provide an air-bag which is incorporated within the steering wheel, the air-bag being adapted to being inflated, in the event that an accident should arise, to form a cushion to protect the driver of the vehicle.

EP-B-0330306 discloses a steering wheel arrangement of this type, which incorporates a horn-blowing switch activated on depression of the central part of the steering wheel, which actually comprises a housing for the air-bag. When the central part of the steering wheel is depressed, an electric circuit is completed, thus effecting blowing of the horn. This circuit incorporates components which form part of the air-bag unit.

A difficulty that has been experienced in connection with the arrangement of EP-B-0330306 is that the air-bag in itself is an essential integer of the arrangement shown, and consequently if it is proposed to provide a motor car which has a steering wheel with an air-bag unit as a "option" it is necessary to provide two totally different types of steering wheel, one steering

wheel being used where the air-bag is provided, and the other steering wheel being used where there is no air-bag.

The present invention seeks to provide an improved steering wheel arrangement, which incorporates an air-bag, but which is so devised so that the air-bag can be omitted without any inconvenience.

According to this invention there is provided a steering wheel assembly incorporating an air-bag unit, the steering wheel defining a space to receive the air-bag unit and being provided with a cover to cover the space, means being provided to mount the cover in position on the steering wheel and additional means being provided to mount the air-bag unit on the cover.

Preferably the cover defines a plurality of parts which extend substantially radially outwardly, the air-bag unit being connected to the steering wheel by connecting means provided in these parts, and the cover being connected to the steering wheel by connecting means provided in these parts.

Conveniently the cover, when mounted in position, is movable, against a resilient bias, relative to the steering wheel.

Advantageously electrical contact means are provided, the electric contact means being closed on movement of the cover against said resilient bias.

Conveniently the electric contact means comprise the means which secure the air-bag unit to the cover.



Advantageously the cover is provided with lines of mechanical weakness which define flaps, the steering wheel also being provided with spokes, each spoke of the steering wheel being substantially aligned with a junction between two adjacent flaps.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which

FIGURE 1 is a sectional view taken through a steering wheel incorporating an air-bag unit taken on the line I-I of Figure 2,

FIGURE 2 is an underneath view of the steering wheel of Figure 1,

FIGURE 3 is a top perspective view of the central part of the steering wheel of Figure 1,

FIGURE 4 is an underneath view of the air-bag assembly of Figure 1, and

FIGURE 5 is an enlarged view of a connection between the air-bag unit and the steering wheel.

Referring initially to Figures 1 to 4 a steering wheel 1 is provided which is mounted on a steering shaft 2. The steering shaft 2 terminates in a narrowed portion 3 which passes through a bore 4 formed in a circular boss 5 that forms the central part of the steering wheel. The upper surface of the boss defines a recess 6 which accommodates a nut and washer 7 secured to a threaded stud

formed integrally with the narrowed portion 3 of the shaft 2, thus securing the steering wheel to the shaft 2. The circular boss 5 supports three substantially radially outwardly extending spokes 7. Each spoke 7 is located at a height above the upper surface of the boss 5 and thus each spoke 7 is associated with a root 8, the inner surface of which defines an upstanding side wall 9 extending upwardly from the upper surface of the boss 5. The upper part of each spoke 7 is recessed 10 adjacent the root to accommodate a cover 11 as will be described hereinafter in greater detail. A counter-sunk bore 12 is provided extending from the under-side of each spoke into the recess 10.

An air-bag assembly 13 is provided which is mounted in position above the upper surface of the boss 5, extending into the space effectively defined between the three upstanding side walls 9 defined by the three spokes 7. The air-bag unit 13 is provided with a cover 11. The cover 11 has an upper surface 14 of generally circular form adapted to lie spaced above the boss 5, the cover having three substantially radially outwardly extending projections 15 which are aligned with the recesses 10 formed in the spokes 7.

The cover is made from metal reinforced plastic material.

Referring to Figure 4, the metal reinforcing element 11 is visible. The element presents an outer rim 17 formed of metal provided with three substantially radially outwardly directed lugs 18 adapted to be aligned with the spokes 7. Each lug 18 carries a connector assembly 19 as will be described in greater detail with reference to Figure 5. The central part of the metal

reinforcing element 16 is not visible in Figure 4, but can be seen in the sectional view of Figure 1. It is to be noted, however, that the central part of the metal reinforcing element is provided with slits or channels which define lines of weakness illustrated in phantom as lines 20 in Figure 3. The lines 20 divide the upper surface 14 of the cover 11 into three distinct areas 21, the junction between each two adjacent areas being substantially co-aligned with one of the spokes.

At this stage it is to be understood that when the air-bag unit is activated, the air-bag is inflated and the cover 11 will break in the lines of relatively weakness of the metal reinforcing element 16, consequently forming the cover into three flaps 21 which open to permit the egress of the inflating air-bag. Since the junction between each two adjacent flaps is located substantially adjacent a spoke of the steering wheel, if the driver of a car in which the steering wheel is fitted has a hand upon a spoke when the bag inflates, there is virtually no risk that the flap will pivot or open in such a way as to hit the hand on the spoke of the steering wheel.

The air-bag unit 22 comprises an outer metal housing 23 to which is secured a gas generator unit 24 by means of a plurality of bolts 25, with part of the gas generator unit 26 projecting downwardly through an aperture 27 formed in the metal housing 23. Part of an air-bag 28 which is shown, schematically, as being folded, is trapped between the upper part 24 of the air-bag unit and the lower part of the metal housing 23. The metal housing 23 is provided with three upwardly and outward extending lugs 29 each secured by way of a bolt 30 to one of the lugs 18 of the metal reinforcing element 11.

At a position opposite one of the spokes 7 of the wheel, as illustrated in Figures 1 and 4, the housing 23 for the gas generator carries a projecting apertured lug 31, and the metal reinforcing element 16 carries a projecting tongue 32 which is inserted through the aperture in the lug 31. This arrangement forms a virtual hinge for one of the flaps 21.

Figure 5 illustrates the connection between the steering wheel 1 and the unit 13.

Initially it is to be noted that the steering wheel is actually reinforced by a metal element 33 which extends across the base of the counter-sunk bore 12. Part of this metal element, 34 is located at a position spaced from the nut 30. It is to be noted that the nut 30 is mounted on a threaded stud 35 which is formed integrally with the cover 11.

The connecting unit 19 which extends between the lug 18 and the counter-sunk bore 12 comprises a cylindrical insulating element 36 having a flanged upper end, the flanges engaging part of the lug 18 adjacent an aperture through which the rest of the cylindrical body passes. The cylindrical body extends through an aperture formed in a metal insert 33 to extend into the counter-sunk bore 12. A flanged sleeve 37 is mounted over the lower end of the cylindrical member 36, the flanged sleeve extending up through the aperture in the metal portion 33, with the flanges engaging the lower surface of the metal portion 33 within the counter-sunk bore 12. A bolt 38 and washer 39 are provided, the bolt being inserted into a threaded central passage 40 provided in the elongate member 36. The washer 39 engages the flanges 37. A helical compression spring 40 surrounds the cylindrical member 36, the upper

end engaging an insulating washer 41 located between the spring 40 and the metal of the lug 18.

It is to be appreciated that the above described arrangement comprises a resilient connection between the unit 13 and the steering wheel 1, which is electrically insulated. Thus a downward pressure on the cover will cause the spring 40 to be compressed and will cause the elongate element to move downwardly thus moving the head of the bolt 38 downwardly within the counter-sunk bore 12.

It will also be appreciated that downward movement of the cover will bring the stud 35 into contact with the exposed portion 34 of the metal insert 33 provided in the steering wheel. This may be used to complete an electric circuit, actuating the horn.

It is to be noticed that in the embodiment described above, the air-bag unit is mounted in position under the cover primarily by means of three fixing nuts, such as the nuts 30 each of which co-operate with a stud 35 which is formed integrally with the cover 11. It is thus to be noted that if the air-bag unit 22 is not provided, the cover 11 can still be mounted on the steering wheel, and a stud 35 will still be present substantially aligned with each spoke, thus ensuring that the horn function will still operate.

Consequently, using an arrangement as described above it is possible to provide a motor vehicle with an air-bag unit or a motor vehicle without an air-bag unit using the same steering wheel and the same cover.

CLAIMS:

1. A steering wheel assembly incorporating an air-bag unit, the steering wheel defining a space to receive the air-bag unit and being provided with a cover to cover the space, means being provided to mount the cover in position on the steering wheel and additional means being provided to mount the air-bag unit on the cover.
2. A steering wheel assembly according to Claim 1 wherein the cover defines a plurality of parts which extend substantially radially outwardly, the air-bag unit being connected to the steering wheel by connecting means provided in these parts, and the cover being connected to the steering wheel by connecting means provided in these parts.
3. A steering wheel assembly according to any one of the preceding Claims wherein the cover, when mounted in position, is movable, against a resilient bias, relative to the steering wheel.
4. A steering wheel assembly according to Claim 3 wherein electrical contact means are provided, the electric contact means being closed on movement of the cover against said resilient bias.
5. A steering wheel assembly according to Claim 4 wherein the electric contact means comprise the means which secure the air-bag unit to the cover.
6. A steering wheel assembly according to any one of the preceding Claims wherein the cover is provided with

lines of mechanical weakness which define flaps, the steering wheel also being provided with spokes, each spoke of the steering wheel being substantially aligned with a junction between two adjacent flaps.

7. A steering wheel assembly substantially as herein described with reference to and as shown in the accompanying drawings.

8. Any novel feature or combination of features disclosed herein.

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

GB 9217433.3

**Relevant Technical fields**

(i) UK CI (Edition K ) B7B (BSB)

(ii) Int CI (Edition 5 ) B60R

**Search Examiner**

PHIL THORPE

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

15 OCTOBER 1992

Documents considered relevant following a search in respect of claims

1-7

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2192841 A (TRW REPA) see particularly figure 1	1
X	EP 0397154 (TOYODA) see whole document	1,3,4,6



Category	Identity of document and relevant passages - 11 -	Relevance to claim(s)

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

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